

# Recombinant technologies

**General Microbiology - Lecture 8**

**Cañada College - Fall 2008**

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# Today's topics

- **Biotechnology**
- **Recombinant technologies**
- **Societal concerns**

# **What is biotechnology?**

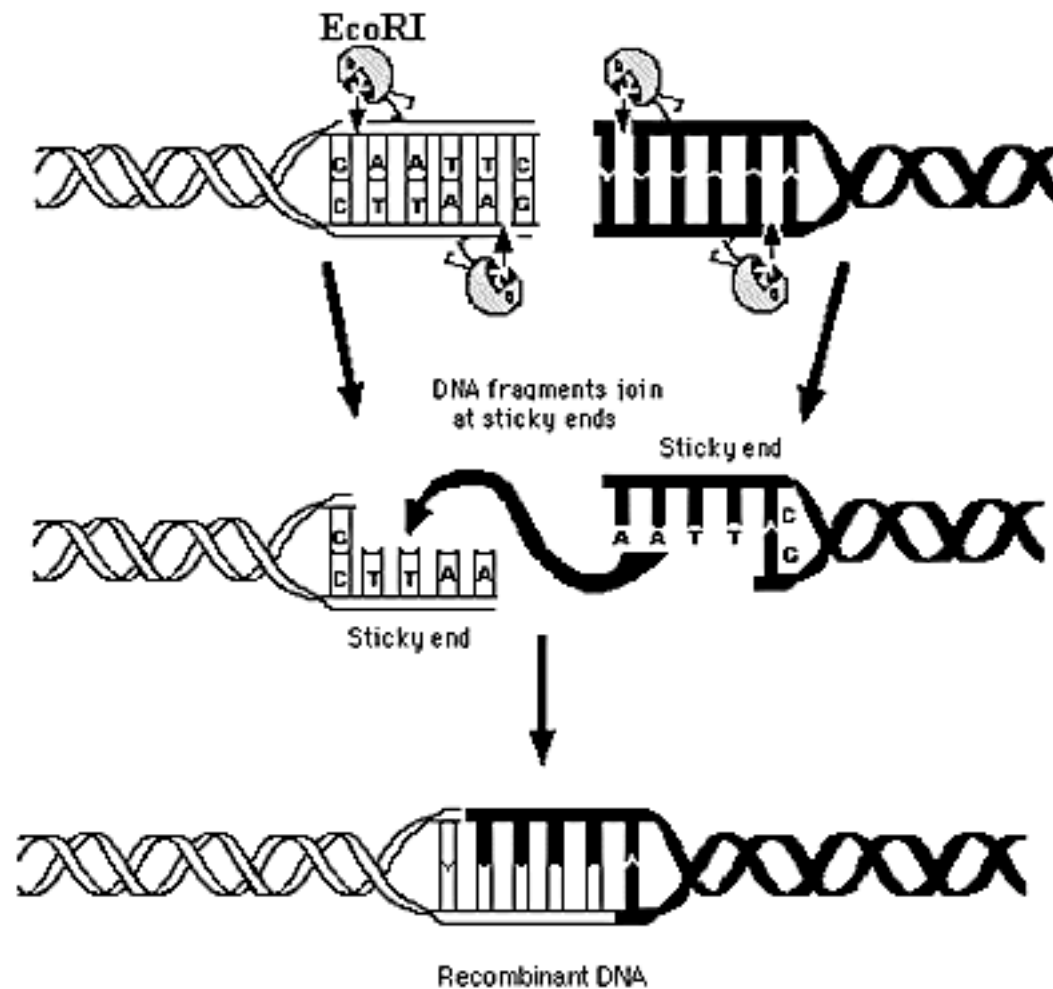
- **Use of microorganisms, cells, tissues, and components thereof to make a product**
- **Humankind has been enjoying products of biotechnology for thousands of years**
- **Modern day biotechnology started during WWI**
- **Genetic engineering lifted domain barriers**

# Recombinant DNA technology

- **Use of artificially recombined DNA to**
  - make useful products, vaccines, medicine, *etc.*
  - generate novel biological capabilities for application in “green” chemistry, agriculture, healthcare, environment, *etc.*
  - enhance humankind’s understanding of the origin of life, evolution, and the structure and function of living organisms

# Toolbox of biotechnology

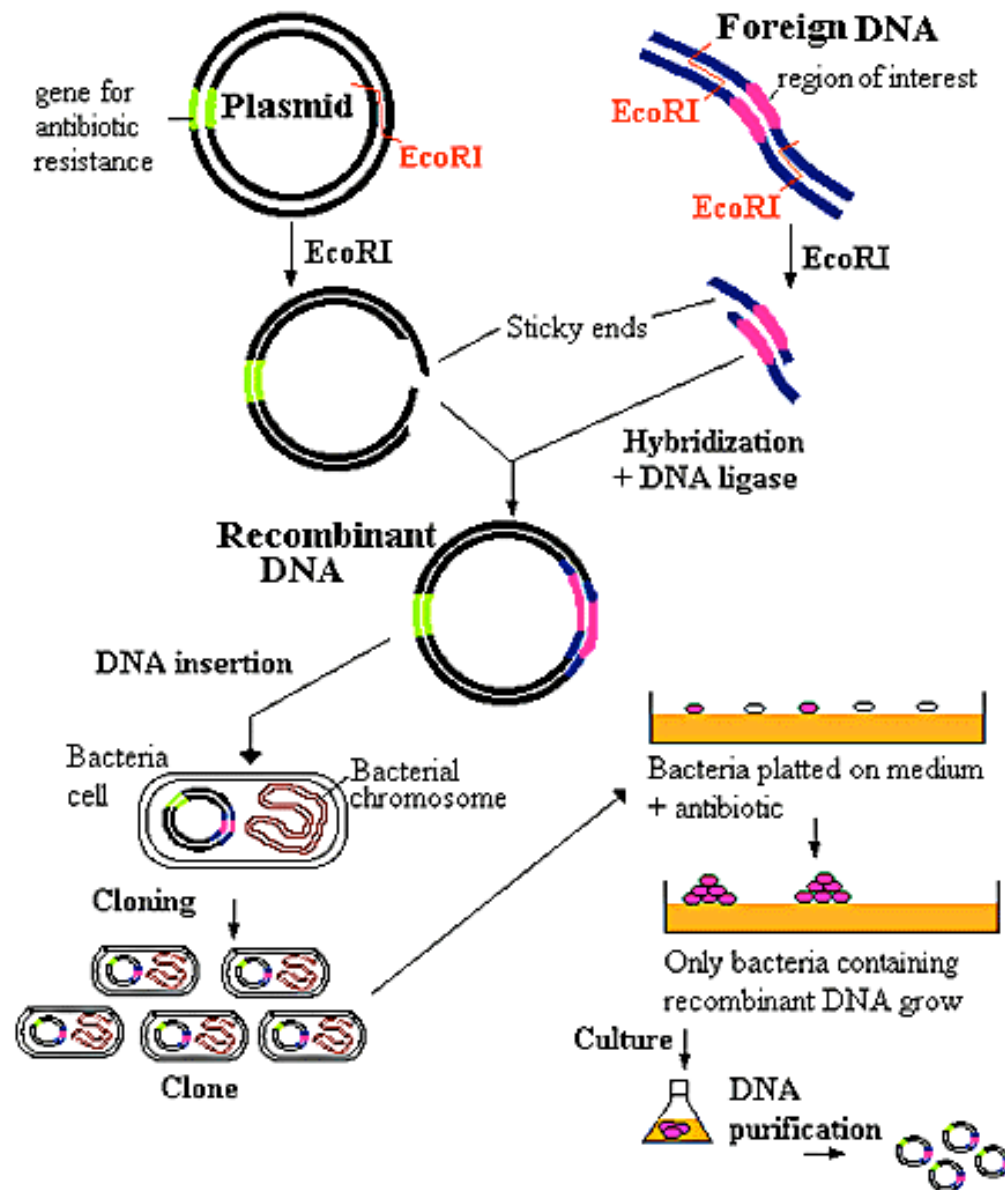
- **Selection**
  - natural vs. artificial selection
- **Mutation**
  - random vs. site-directed mutagenesis
- **Restriction enzymes**
- Vectors, cloning
- Polymerase chain reaction (PCR)



## Restriction Enzyme Action of EcoRI

# Toolbox of biotechnology

- Selection
  - natural vs. artificial selection
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- **Vectors, cloning**
- Polymerase chain reaction (PCR)



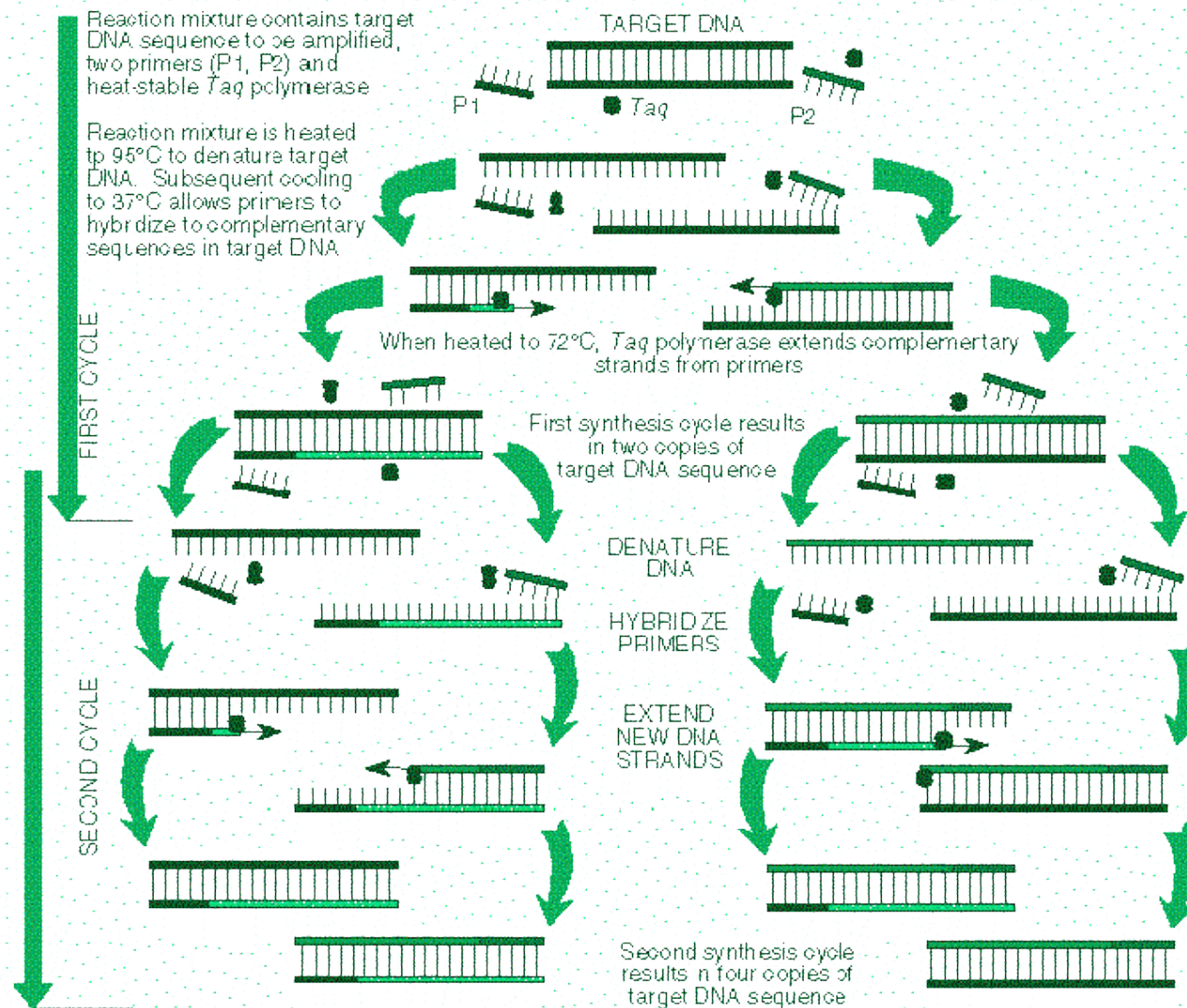
## Cloning into a plasmid



# Toolbox of biotechnology

- Selection
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- Restriction enzymes
- Vectors, cloning
- **Polymerase chain reaction (PCR)**

## DNA Amplification Using Polymerase Chain Reaction



Source: *DNA Science*, see Fig. 13.

# Applications

- **Therapeutics**
- **Agricultural**
- **Food industry**
- **“Green” chemistry**
- **Oil production**
- **Bioremediation**
- **Forensics**
- **Basic science**

# Safety, biosafety, and bioethics

- **Freedom of science**

- safe, ethical, and meaningful conduct of research
- *“...Science knows no country, because knowledge belongs to humanity, and is the torch which illuminates the world.”*

Louis Pasteur

- **NIH Guidelines regulate recombinant DNA R&D**
- **Institutional Biosafety Committee (IBC)**
- **Bioethics and societal concerns**
- **CDC’s select agent Final Rule (42 CFR 73)**